



PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Manabu Ohta, et al.  
Application: DEVICE AND METHOD FOR DETERMINING RARE SHORT  
CIRCUIT  
Serial No. : 09/944,689<sup>688</sup>  
Filing Date: August 31, 2001  
Art Unit: 2836  
Case: 0154/01025

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FEB 27 2004

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AMENDMENT-CLAIMS

Dear Sir:

CLAIMS

1. (currently amended) A rare short circuit determining device blade fuse element for determining whether a rare short circuit, which results from the generation of heat exceeding a predetermined value, has occurred in a load circuit, the rare short circuit determining device blade fuse element comprising:  
a fuse portion which serves as a sensor for detecting a load current, which flows through the load circuit, and for generating a detection signal, wherein the fuse portion melts and breaks when a dead short circuit is likely to occur in the load circuit; and  
a determining circuit connected to the sensor fuse portion for determining

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whether a rare short circuit has occurred, wherein the determination circuit calculates one of a first parameter and a second parameter every predetermined time interval based on the detection signal, the first parameter relating to a first time period during which the load current exceeds a predetermined reference current value, and the second parameter relating to a second time period during which the load current is less than or equal to the predetermined reference current value, wherein the determining circuit cumulates the calculated one of the parameters every predetermined time interval to calculate a cumulative parameter value and determines whether a rare short circuit has occurred based on the cumulative parameter value.

2. (currently amended) ~~The rare short circuit determining device~~ blade fuse element according to claim 1, wherein the determining circuit is connected to a shutdown circuit for stopping the supply of the load current from a power supply to the load circuit, and wherein the determining circuit controls the shutdown circuit to stop supplying the load circuit with the load current when it is determined that a rare short circuit has occurred.
3. (currently amended) ~~The rare short circuit determining device~~ blade fuse element according to claim 1, wherein the first parameter is one of joule heat and arc heat that are generated in relation with the first time period in the load circuit, the second parameter is radiated heat radiated from the load circuit during the second time period, and the determining circuit calculates one of the joule heat, the arc heat, and the radiated heat.
4. (currently amended) ~~The rare short circuit determining device~~ blade fuse element according to claim 3, wherein the determining ~~device~~ circuit cumulates the calculated one of the heats to calculate a total heat and determines whether a rare short circuit has occurred based on the total heat.
5. (currently amended) ~~The rare short circuit determining device~~ blade fuse

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element according to claim 4, wherein the determining circuit determines that a rare short circuit has occurred when the total heat exceeds a predetermined value.

6. (currently amended) ~~The rare short circuit determining device~~ blade fuse element according to claim 5, wherein the determining device circuit adds the joule heat or the arc heat and subtracts the radiated heat when calculating the total heat.

7. (currently amended) ~~The rare short circuit determining device~~ blade fuse element according to claim 6, wherein the determining device circuit is connected to a shutdown circuit for stopping the supply of the load current from the power supply to the load circuit, and wherein the determining circuit controls the shutdown circuit to stop supplying the load circuit with the load current when it is determined that a rare short circuit has occurred.

8-10 (Canceled)

11. (New) The blade fuse element according to claim 1, wherein the blade fuse element is detachably installed in a vehicle electric circuit.

12. (New) The blade fuse element according to claim 1, wherein said predetermined time is shorter than a time during which a rush current is produced.

13. (New) The blade fuse element according to claim 1, wherein said predetermined time is 1 millisecond.

Respectfully submitted,

**CHERSKOV & FLAYNIK**

By: 

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